University of Hawaii · Cooperative Extension Service · Circular 424

U.H. POTTING MIX

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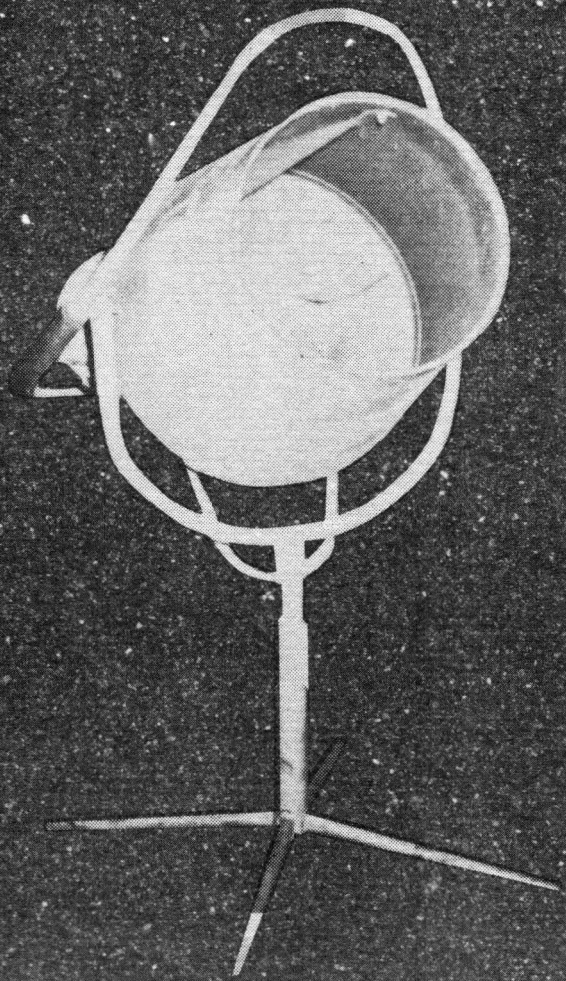

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Because black sand and high-quality topsoil, two common ingredients for soil mixes in island nurseries, are becoming scarce, it was decided to examine other locally available aggregate and organic materials (listed in Table 1). Consideration was given to such criteria as drainage and aeration, ease of handling and mixing, reasonable cost, and avoiding the use of soil to expedite exportation of rooted plants.

In experiments conducted during the past three years a mixture consisting of ⅓ *hapuu* and ⅔ "Volcanite" by volume plus 20 pounds of "Milorganite" per cubic yard gave by far the best results. Hapuu is a finely ground fern stem available locally. "Volcanite" is a trachyte pumice from Puu Waa Waa cinder cone in Waimea, Hawaii.

These ingredients were thoroughly combined in a slightly dampened condition using a mechanical cement mixer for at least seven minutes. Immediately after removing from the cement mixer, without sterilization of any kind, the U.H. Potting Mix was ready to be placed in the pots for planting.

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U.H. Potting Mix

Hapuu finely ground	⅓ by volume
"Volcanite"	⅔ by volume
"Milorganite"	20 lbs. per cubic yard

Dampen and mix in mechanical concrete mixer.
(Cost: 13 cents per 8-inch pot.)

Comments

Different soilless media will grow plants, but all combinations containing ground hapuu seemed better suited as container stock. The higher pH of one alternative, "mill ash," may have contributed to poorer growth.

Raw bagasse is to be discouraged as an organic source because when it decomposed it tied up nitrogen, caused some compaction and poor drainage, and inhibited root development.

With the exception of the treatments containing bagasse, aeration and drainage problems were eliminated. Even three times daily watering did not result in water logging.

Weed seeds wind blown out-of-doors appeared to be the only source of weeds.

"Volcanite" or cinder in combination with ground hapuu containing half or more by volume of aggregate have proved sufficiently successful to be recommended as a potting media for container-grown stock.

The authors encourage growers to call on them for help in comparing this U.H. Potting Mix with those they are now using.

Experimental Results

Experiment I involved mixing equal parts of organic material with the aggregate. Ground hapuu, bagasse, and mill ash organic materials were each mixed with red cinder (⅛- to ⅜-inch grade), "Volcanite" (fine grade) and "sponge rock" as aggregates. The mixtures were thoroughly combined using a cement mixer. Milorganite fertilizer was added at the time of mixing at a rate of 20 pounds per cubic yard of media. This was assumed to be adequate fertilization and no additional fertilizer was used during the period of plant growth.

Rooted cuttings of "common pink" hibiscus and "China" asters that had been started in peat pots were planted in 8-inch plastic pots in the greenhouse in May 1964. Measurements of the hibiscus were taken by thinning each cutting to three branches and measuring the total linear growth every two weeks. The asters were evaluated by taking a count of the total number of true leaves per plant at two-week intervals. Leaf color was noted on both species. Water was applied by hand daily. Five replicates per treatment of hibiscus and 6 replicates of the aster were evaluated and analyzed. The information obtained is summarized in Table 1.

Table 1. Influence of media on growth of hibiscus and aster

	Media Combinations	pH	Wt. lbs./pot	Growth hibiscus (inches)	Average no. aster leaves	Cost pot	Color of leaves
1a	Hapuu—cinders	4.8	7.9	62	40	.10	Excellent
1b	Hapuu—volcanite	6.0	10.8	58	37	.12	Fair
1c	Hapuu—sponge rock	5.3	5.6	43	41	.22	Fair
2a	Bagasse—cinders	7.0	8.3	20	14	.02	Poor
2b	Bagasse—volcanite	6.7	9.3	19	14	.04	Poor
2c	Bagasse—sponge rock	6.2	5.4	16	15	.14	Poor
3a	Mill ash—cinders	7.4	9.4	37	32	.01	Poor
3b	Mill ash—volcanite	7.5	10.8	47	30	.04	Poor
3c	Mill ash—sponge rock	7.4	5.9	42	30	.13	Poor

Highly significant differences were found in hibiscus growth due to the organic material used. Ground hapuu was better than mill ash and mill ash was better than bagasse. The aggregate used in the media affected growth to a lesser extent, with "Volcanite" and cinders performing about equally and "sponge rock" having less growth.

There was no effect on aster growth due to the kind of aggregate; all performed well, but there was a highly significant difference due to the organic materials used. Media containing hapuu resulted in better growth of the aster than media containing mill ash. Bagasse gave unsatisfactory growth due to decomposition and compacting.

With the above results in hand, Experiment II was conducted starting in June 1966 to use the best materials in a wider range of proportions.

Only rooted hibiscus were used in this experiment, conducted out-of-doors using automatic watering three times daily. Ten treatments were used with five plants per treatment. Plants were grown in 8-inch plastic pots for 14 weeks and evaluated every two weeks following the plan of Experiment I.

Table 2. Combinations of ingredients used in Experiment II

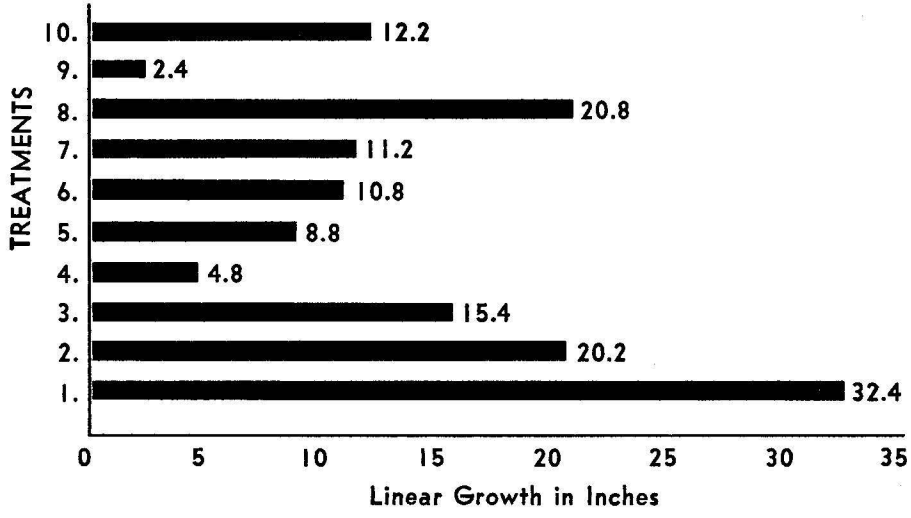
	(By volume)		pH
1.	1/3 hapuu	: 2/3 "Volcanite"	5.7
2.	1/2 hapuu	: 1/2 "Volcanite"	5.3
3.	2/3 hapuu	: 1/3 "Volcanite"	5.3
4.	1/3 hapuu	: 2/3 cinder	4.4
5.	1/2 hapuu	: 1/2 cinder	5.1
6.	2/3 hapuu	: 1/3 cinder	4.8
7.	1/3 mill ash	: 2/3 "Volcanite"	6.9
8.	1/2 mill ash	: 1/2 "Volcanite"	7.1
9.	1/2 hapuu	: 1/2 "Volcanite"	4.6
10.	1/2 hapuu	: 1/2 "Volcanite"	5.3

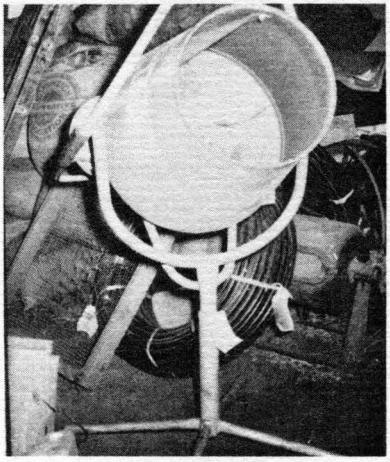
In addition, treatments 1 through 8 received treated sewage sludge from Hawaii Kai Treatment Plant at the rate of 40 pounds per cubic yard. Treatment 9 received no fertilizer and treatment 10 received Milorganite fertilizer at the rate of 20 pounds per cubic yard to give equal amounts of nitrogen as the 40 pounds of Hawaii Kai sludge. This gave a test of the effectiveness of the two fertilizers as compared with no fertilizer in the media by analyzing the results of treatments 2, 9, and 10.

At the end of 12 weeks a mixed fertilizer (15-5-5) was sprayed over all the treatments at a rate of 6 tablespoons per 50 pots.

Upon analysis of the results, treatment 1 was found to be significantly better than all the other treatments. Treatments 8 and 2 were also found to be better than the poorest treatments, 4 and 9, but no other differences could be shown statistically when all the rest of the treatments were compared.

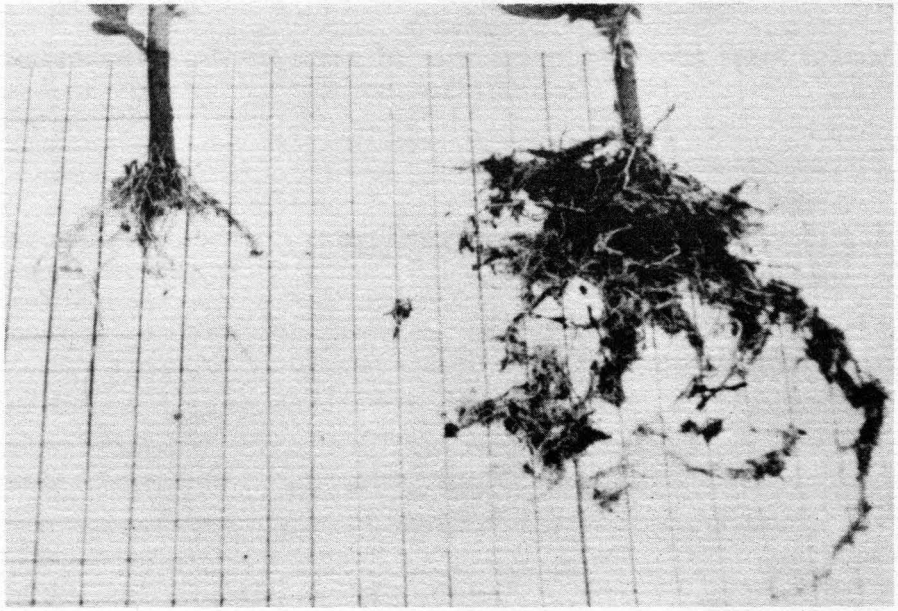
Chart I.
Average linear growth per plant after 14 weeks for the 10 treatments used in Experiment II





Cement mixer is essential for thorough mixing of ingredients.

Left to right: 1/3 hapuu, 2/3 "Volcanite"; 1/2 hapuu, 1/2 "Volcanite"; 2/3 happu, 1/3 "Volcanite."



Left, root growth with bagasse in mix; right, root growth with hapuu in mix.

Acknowledgments

Pacific Concrete and Rock Co., Ltd., for "Volcanite."
H. C. & D. Ltd. for red cinder from Molokai.
Niu Nursery for ground hapuu.
Oahu Sugar Co., Ltd., for mill ash and bagasse.
Hawaii Kai Development Co. sewage treatment plant for sludge.
Ultramar Chemical Co. for Milorganite.
Hawaiian Agricide & Fertilizer Co. for "sponge rock."
Dr. Nathan C. Burbank, Jr.

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Cooperative Extension Work in Agriculture and Home Economics
College of Tropical Agriculture, University of Hawaii, Honolulu, Hawaii 96822
United States Department of Agriculture Cooperating
C. Peairs Wilson, Director, Hawaii Cooperative Extension Service
Distributed in Furtherance of the Acts of Congress of May 8 and June 30, 1914
CIRCULAR 424—JANUARY 1968